

Remarks

ON

MECHANO-THERAPY IN DISEASE:

WITH SPECIAL REFERENCE TO
OSTEOPATHY.

BY

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THE treatment of disease by physical methods has in recent years received a large share of attention. It is very remarkable that the medical profession should so long have neglected such a wide field of therapeutics, especially when in its various branches it has long been exploited by so many irregular practitioners. It would almost seem as if an element of mystery was necessary to make any system popular amongst medical men, and this belief is strengthened by the fact that the only physical method they have so far carefully studied and practised has been electricity. The prevention and cure of disease by manipulation has been to a very large extent left to the layman, and the practitioner who dabbled in it has been too often looked at askance by his medical brethren. If we are not to fall behind in the race for honours in this branch of therapeutics, it is high time we began to interest ourselves more deeply in it, as already the medical profession in America is suffering severely at the hands of a new race of manipulative practitioners, who have recently, indeed, invaded our country.

At all times interested in such methods of treatment, my attention was several years ago forcibly directed to this system in particular, by the remarkable improvement of several of my own reputedly incurable patients, and I at once took steps to inform myself as to the good and bad points of such a potent method of treatment.

I learnt that in America there were over 5,000 practitioners of the art of osteopathy—as it is called—and that these men were accorded the legal status and privileges of the medical profession in all but one or two States in the Republic. I therefore set myself to study carefully all the books which I could obtain on the subject, and in addition endeavoured to obtain such practical knowledge of its methods as was possible in this country. Having learnt all I could in this manner, I subsequently visited America to see the treatment in the land of its birth, and was astounded to discover that it had not only taken a great hold upon the affections of the people, but that no fewer than a dozen schools were in existence for imparting instruction on the subject and at the same time granting diplomas to those who had spent three years in its study. The tuition was in great part conducted by medical men who had been attracted by the merits of osteopathy as a therapeutic method, and whilst the training could not bear comparison with that required of a medical student it was calculated to give a thorough knowledge of anatomy as the groundwork of the art.

I was cordially welcomed not only at the schools but also at the dispensaries, and took every opportunity of conversing with the patients as to any benefit received, as well as comparing the methods of the various practitioners. I was struck with the enthusiasm which the osteopaths display in the practice of their profession, not hesitating to exalt it above every other, and glorifying it as the only rational treatment extant; as well as with the gratitude expressed by the patients, most of whom had previously been under the treatment of allopathic physicians.

I came to the conclusion that there must be some virtue in a method which had such vitality as to spread all over a continent in a few years, and at its present rate of progress bade fair to travel all over the world. I was hardly surprised at this, as my own experience in its practice had at least disclosed the fact that it was of striking benefit in selected cases.

The simplest definition of osteopathy which I have yet met is the correction of anatomical abnormalities which produce physiological discord, but its exponents do not hesitate to claim for it a much higher status. They almost all agree in calling it a distinct system of medicine whose therapeutics comprehends: (1) Manipulation,

including surgery, for purposes of readjusting tissue relations; (2) scientific dietetics; (3) personal and public hygiene. It must be confessed, however, that manipulation is practised to the exclusion of every other method, and the system is acclaimed as one which permits you to eat and drink what you fancy and to live as you please, so long as you do not ignore the more important laws of health. The diagnosis consists in the discovery of a "lesion," which is something more than that so well known in surgery, and is defined as a structural change which affects the functional activity of any tissue. Such lesion may be found in any tissue, but its existence is more easily recognized in bone, ligament, and muscle. The most common varieties of lesions are what are called "subluxations" of bones, thickened ligaments, and "contractured" muscles.

A true lesion is said to be palpable, sensitive on pressure, and the functional disturbance produced has some relation to the anatomical abnormality existing. The *point d'appui*, however, of the osteopathic system is the subluxation, and most practitioners of the art are liable to find one or more in every case they examine. The centre of attraction is the spinal column, and the relation of its various vertebrae to one another and the ribs. The slightest change in the normal relation of the articulating surfaces is designated a subluxation, and this may be primary or secondary. In the former case it is produced by direct action on the bone or muscles controlling its movement, and is considered to be a source of irritation to the spinal nerves in direct central relation to it. In this way it is stated to affect the viscera and blood vessels, thus causing perversions of function which are recognized as symptoms of disease. In the latter case it arises from excessive irritation to the peripheral ends of sensory nerves, either those terminating in the skin and subject to temperature changes, or those ending in the visceral mucosa and subject to irritation from the presence of food of an indigestible character, etc. Presumably the pressure of secondary subluxations on the spinal nerves will make them as dangerous as the primary variety, and render their reduction as necessary. The chief function, therefore, of an osteopath is to reduce the subluxations and to correct the lesions which he may discover, and in some isolated cases this may be done in what is called "one treatment." The fact, however, that the majority of cases must be treated for two or three months proves that they are not easily kept reduced; and, needless to say, it would not pay the osteopath to cure his cases so quickly.

The usual course is to charge an initial fee for twelve "treatments" at the rate of three per week and to continue the treatment of the case for one or more months, thereafter giving "treatments" less frequently, although it is sometimes found that patients are unable to stand treatment so often. But patients suffering from all forms of disease who consult an osteopath are treated solely by manipulation. Manifestly they cannot all have vertebral or other subluxations of a serious type, and I am glad to say that in my interviews with leading osteopathic practitioners and teachers in America I had repeated confirmation of this fact. I was assured by one that he rarely found them, and by another well known teacher that he never thought of looking for them. It is important, therefore, to inquire whether there are no other conditions present which contribute to the unquestionable relief acknowledged by some of their patients.

This is found in that state generally described by them as "contractured" muscle—a condition now being recognized by other medical men outside of the osteopathic ranks.

Boardman Reed, in his work, *Diseases of the Stomach*, quotes Dr. John P. Arnold, who describes this peculiarity as a somewhat doughy swelling, or in chronic cases gristly, tense, cord-like feeling of the muscles, more particularly the erector spinae.

Flint and Hammond likewise refer to the condition, and give rules for diagnosing and treating it. I have no doubt of its existence, and in its milder forms am accustomed to associate it with the muscular fibrositis of Dr. Gowers. In the more aggravated forms, however, the muscle is swollen, sodden, almost oedematous, very sensitive, and is shorter and thicker than the normal, so that the points of origin and insertion are approximated. Hence an



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infinitesimal example of a subluxation arises. The causation of these contracted muscles is not always clear, but osteopaths teach that they are produced directly by external violence or unsuitable environment, or indirectly by long-continued reflex irritation keeping up contraction of the muscles. The persistent backache complained of by some men and many women is almost certainly of this class, and hence the difficulty of curing it solely by internal medication.

Even should the primary cause be removed, it does not follow that the damaged muscle can return without aid to its original healthy condition. Exercise in such a state of affairs is most painful, and seldom followed by amelioration.

Hydropathy, massage, electricity, and other physical methods are of more value and are often successful. The real cure, however brought about, consists in accurately restoring the bony relationship, and when the condition has been produced by violence, this is done by the osteopath at once and directly. When, however, it is produced by other causes, the proper course is to relax the muscles by separating as far as possible the points of origin and insertion of the muscles. I am of opinion that this is the secret of the relief afforded by an osteopathic "treatment," and in 95 per cent. or even more of the cases under their care is all the treatment that is accorded them, although doubtless adhesions are likewise broken up during this stretching process. Of course, there is nothing very novel in all this, and whatever the osteopath may say, the treatment resolves itself into a combination of massage and Swedish movements, the latter being modified so as to be mostly capable of application by one person on a couch or stool in his own consulting room or at the home of the patient.

So indignant, however, is the osteopath at the suggestion that massage has anything to do with his manipulative efforts, that he frequently foregoes the undoubtedly beneficial results of the preliminary relaxation and stretching, and proceeds by violence to attack the affected part, endeavouring to reduce the subluxation and so cure the lesion.

I have no hesitation in saying that the vast majority of his cases are quite capable of being successfully treated by other methods, and I am confirmed in this view by the statement of the dean of one of their schools, who assured me that all well-educated osteopaths were perfectly cognizant of this fact. I am convinced, however, that many ailments, and especially acute conditions such as typhoid fever, pneumonia, nephritis, "cold in the head," are liable to be seriously aggravated by manipulative attention. It is lamentable that the apotheosis of mechano-therapy should result in such ill-guided enthusiasm as its application to many acute disorders would testify. Every now and again the American medical journals, and even the law reports of the daily papers, contain records of cases injured during osteopathic treatment, but the system has now such a large public following, and its legal position is so secure, that it is difficult to obtain a conviction.

If it be a system of medicine, at the best it is purely a system of one idea. Its nosology is a lesion; its symptomatology, a subluxation; its therapeutics, manipulation; while its pathology is accommodating enough to cut both ways, the subluxation being either the cause or the effect of departure from function.

Despite these limitations, however, as a method of treatment it serves a useful purpose not only in emphasizing the value of manipulation in disease, but in laying stress on cases which have previously been ignored or undiagnosed by the profession, and hence have fallen into the hands of the bonesetters.

We are too much in the habit of thinking that bonesetters make their reputation by breaking down ankylosed joints in patients who have refused the services of or become impatient with their own medical man. This may be, and no doubt is, in a great measure true; but their reputation would be short-lived were this all their work, for nothing could prevent the most disastrous sequelae in a very large proportion of their cases.

The regular practitioner of medicine has an unaccountable reverence for bones and joints, especially the bony case of the spinal canal, and this fact was admirably

pointed out by Dr. Wharton Hood many years before osteopathy was invented. He published the results of a careful investigation into the methods of Hutton, the bonesetter, and showed that he obtained his results by a combination of relaxation and counter-pressure, much in the same way as the osteopath, and that his special point of attack was the spinal column. But his book has almost been forgotten and his precepts neglected.

I do not hesitate to plead for the admission of this new form of scientific bonesetting among the recognized methods of treatment practised by the medical profession. My success in the following cases is entirely due to the study I have made of the subject, and I am sure I would have failed to be of service to any of the patients without a knowledge of osteopathic methods.

J. F., aged 48, consulted me on August 24th, 1908, complaining of a pain, of six months' duration, in the right occipital region. His head was turned slightly to the right side, and when I asked him to look straight to the front he said he could not do so on account of the pain. His story was that six months previously he slipped down eight steps, falling on the right side of his lumbar region. He experienced a little pain in this region on getting up, but this was as nothing to the severe pain which came on in the back of his neck and head as the immediate result of the accident. This took place at 7 a.m. and he returned to bed hoping it would all pass off, but as he got no better he sent for a medical man, who prescribed some treatment and ordered him to remain in bed for four or five days. At the expiration of this time he was well enough to get up so far as the pain in his back was concerned, but the pain in his head—or "headache" as he called it—was as bad as ever, and he considered this strange, as he had never had a headache in his life before. During the ensuing six months he saw several doctors, amongst them a consulting surgeon, but derived no benefit. When I examined his neck I found a distinct and decided subluxation of the atlas, the first and only one I have ever come across in my four years' experience of this kind of work, although if we are to believe the osteopath this is the most frequent subluxation in the body. I had no doubt about it. The left transverse process was near the angle of the left inferior maxilla and the right transverse process near the right mastoid bone. I considered that there was pressure on the right suboccipital nerve and that reduction of the subluxation was necessary. This I effected after some preliminary relaxation, and I was rather surprised to find that no click was to be heard during the process, as I had quite anticipated something of the kind.

From that date to this the man has had no recurrence of his pain. In mentioning the matter to several of my medical friends I was astonished to find that they thought little of the matter and referred me to textbooks of surgery for similar cases. These I consulted without success, and I believe I am correct in saying that no such case is recorded in any textbook.

In relating the matter to my friend, Mr. James Sherren, of the London Hospital, he agrees with this view, but referred me to vol. xl of the *Clinical Society Transactions*, London, 1907, where I found several cases recorded by Mr. Edred Corner, under the title, Rotary Subluxation of the Atlas. Four of these were cases of, or referred to by, Professor Howard Marsh, and he considered that in each instance one of the tendons or one of the bundles of a muscle in the back of the neck had become entangled with the posterior tubercle of the transverse process of one of the cervical vertebrae. Two had been cured by anaesthetics and reposition, one by manipulation, and one refused treatment. Mr. Corner looked upon his case as a real subluxation of the atlas, and wondered whether some of the above-mentioned four cases might not have been of the same order.

Evidently my friends had confounded the condition with dislocation of the atlas, which is recorded as being common enough, but always fatal, and of which I have myself previously reported a case in the *Glasgow Medical Journal*.¹ The click on reduction, which, in common with Mr. Edred Corner, I expected but failed to get, is only heard in cases of unilateral dislocation of the lower cervical vertebrae—a condition stated to be fairly common.

Mr. A., aged 24, consulted me in June, 1907, for a pain in the back of his neck. On examination I found a slight swelling on the left side in the neighbourhood of the transverse process of the fourth cervical vertebra, which was very sensitive. This I concluded was a subluxation of the fourth cervical vertebra, and with little difficulty reduced it. The patient experienced no further pain for eleven months, when he again "cricked" his neck. The pain returned, and a swelling gradually appeared, which had the peculiarity of becoming larger and smaller at intervals. On examination I recognized a subluxation of the fourth cervical vertebra, with an enlarged and painful lymphatic gland in its immediate neighbourhood, but in a more superficial



position. When reduction was effected upon this occasion, a decided click or snap was heard, not only by me, but by a friend of the patient, who was sitting at the other side of the room. I feel convinced that this noisy snap was caused by the breaking of some fibrous adhesion. On Mr. A.'s second visit, in a week's time, not only was there no swelling to be detected, but the pain had completely disappeared.

This case is of great interest on account of the swollen lymphatic gland. It is a distinct piece of evidence in favour of the statement that slight displacements or subluxations go on acting as a focus of irritation till they are reduced. The intermittent swelling of the lymphatic gland showed that there was an ever-present pressure on sensitive structures sufficient to produce inflammation. If this can take place superficially it is quite possible that it may occur internally and set up some trouble.

Mrs. A. B., aged 35, consulted me in October, 1908, for backache of two years' duration. Careful examination revealed nothing to account for it excepting an irregularity in the vertebrae in the lower dorsal region. This consisted of an approximation of the spinous process of the eleventh dorsal to that of the tenth, and a corresponding separation from the twelfth. At the same time there was pain on pressure over the spinous process and on the right side thereof. I concluded that I had again to deal with a subluxation, but this time of a slightly different character. Careful relaxation of all the tissues twice a week for about a month produced little benefit and no apparent improvement in the position of the respective vertebrae. Accordingly I endeavoured to replace the eleventh vertebra according to osteopathic instructions. These are simply a modification of surgical rules, and consist in (1) exaggerating the lesion by bending the body away from the prominent side of the vertebra; (2) bending the body forward to separate the articular surfaces; (3) lateral flexion of the body to the same side as the lesion, and an endeavour to raise the body at the same time. During these three movements the thumb exerts pressure on the side, upper, or lower surface of the spinous process, and, in the third movement especially, endeavours to replace it. This is not always possible the first time it is tried, and even when successful the bone does not always remain in position. This is obvious from the fact that in this case the shape had been altered by its long residence in the new position and its ligaments and muscles stretched and weakened by the unaccustomed tension. In the case in question I found at a subsequent visit that the subluxation had recurred and required reposition; but after half a dozen experiments of this kind it stayed in its place and the pain disappeared. From careful watching of this patient in her mode of sitting and walking, I believe that awkward posture had much to do with the occurrence of the malposition of the vertebra, and it is doubtless due to this fact that so many backaches persist, despite repeated medication and treatment.

The habit of sitting with one leg crossed over the other and the shooting backwards of the lumbar curve must occasion great strain of the ligaments and muscles of the spinal column. It is, therefore, necessary to educate such patients into more physiological habits and to encourage them to indulge in a few physical exercises to strengthen the muscles.

L. E., aged 35, was sent to me by Dr. Stacey Wilson in February of last year suffering from pain of seven months' duration in the lower region of his back, the crest of the ilium, the pubis, and shooting down his left leg. He was a quarryman and had fallen from a height of 40 ft. on his back. Fortunately, the fall was broken midway, or he would have been killed. On examination, I found that the posterior spinous process of the left innominate was depressed—the crest of the left ilium less easily palpated than that of the right side and a slight inequality in the pubic region. The two last lumbar vertebrae and upper part of the sacrum were likewise too prominent.

I concluded that the force of the accident had been spent on the tissues in the neighbourhood of the crest of the left ilium, and had forced the whole innominate from its position, producing a rotation upwards and forwards along an axis passing horizontally through the pubic articulation. After much preliminary relaxation, I therefore applied force in such a manner as to endeavour to make the innominate travel in the opposite direction, and was gratified to find that by degrees the bone responded. The treatment was repeated at infrequent intervals, but with improving results, and by the end of July the patient was practically well.

Books on surgery declare that such conditions as I have described are very rare, whilst according to the osteopath they are met with only less frequently than luxations of the atlas, and many strange and varied symptoms are attributed to the deformity. In all probability the condition occurs more frequently than we are willing to admit, and, like the case just quoted, left unreduced with disastrous consequences.

I might go on quoting cases of a similar kind which have occurred in my practice, but I have described a sufficient number to show that slight deformities can be present in

the bony frame capable of giving rise to severe pain, and which are liable to be overlooked by medical men. Cases of this kind frequently fall into the hands of the bone-setter, and, after all, the treatment described is more or less that of scientific or regulated bone-setting.

None of the cases which I have described could have been treated successfully without some form of manipulative therapeutics, and it is of prime importance that we should be prepared to recognize and deal with such cases. If we deny the possibility of the existence of so-called subluxations—as is the custom with medical men—we lay ourselves open to the charge of perpetuating the presence of such irregular practitioners in our midst by encouraging their practice. We know that there are three sets of muscles between individual vertebrae—the intertransversales—the interspinales, which are met with in all parts of the column, although inconsistently and irregularly—and the eleven pairs of rotatores spinae in the dorsal region. These last especially do not exist without the possibility of rotation between individual vertebrae such as is affirmed by the osteopath, and it is not incredible that the action of the other two pairs may occasionally be capable of causing an approximation of spinous and transverse processes towards each other.

It is reasonable, seeing that the erect posture is maintained by a distribution of a strain equally over all the joints of the vertebral column, to infer that when there is a displacement of one of these vertebrae too much strain will consequently fall upon the ligaments and muscles between it and its neighbours, and until it is replaced pain will be likely to arise.² . . . The conservatism of the medical profession has allowed many forms of treatment, like massage, osteopathy, electricity, and Swedish exercises, to be monopolized by irregular practitioners when they should have been captured for the benefit of rational medicine and the good of the public.³

I should like to add a few words with regard to the use of this form of manipulative treatment in cases which are usually quite successfully dealt with by other therapeutic methods. It is the special weakness of this, as of every other, method of treatment that too much should be claimed for it by its devotees, but as they deliberately assert that it is the only rational mode of therapeutics they are compelled to use it in every kind of case, to the exclusion of every other form of treatment. When one considers that there is practically no indication for the use of mechano-therapy in these cases it is surprising what success is obtained by the method. The beneficial results may be attributed to suggestion, correction of minor physical deformities, stimulation of the circulation as in massage, or, what is most probable, the stimulation of the central and sympathetic nervous systems by the application of force over the vertebrae and the heads of the ribs. Whether it be possible to stimulate directly the nerve centres in the spinal cord it is difficult to say, but indirect stimulation in the method I have mentioned is quite possible. These spinal centres are alluded to in osteopathic textbooks in no vague nor uncertain manner, but with a dogmatism and certainty begotten of beneficial therapeutic results.

Just how much damage has been perpetrated by its advocates in their efforts to establish its claim to be a system of medicine it would be hard to say. Two years ago there was presented in one of their journals a series of seventy cases of cancer absolutely cured by osteopathy. On reading these cases one could not resist the conclusion that the reports were prepared for public consumption, as, needless to say, in no case was the evidence conclusive, or such as would bear investigation by scientific men.

I must confess that I have not hesitated to use the method in cases of asthma, neurasthenia, neuralgia, and others which had resisted the orthodox methods of treatment, and I am bound to add that in some cases I have had beneficial results, which could not have been attributed to the influence of suggestion.

Some of the benefit derived may have been due to improved physical condition which naturally results from the treatment, and some of it may have been due to the preliminary relaxation of the muscles and the breaking down of adhesions. "The osteopath claims that all disease is due to displaced tissue, the replacement of which is a prerogative of his own and has, as its sequence, a perfect cure."⁴ The simplest method of refuting such a statement is to cure a patient of neuralgia by a short course of iron for the anaemia, which was the causative

factor, when the same patient has just ceased from a course of laborious attempts to rectify the defective spinal condition by an osteopath without any good results. But I can see no impossibility in the statement that vertebral and costal displacements may exert direct pressure on the spinal nerves as they emerge from the intervertebral foramina, or on the sympathetic ganglia which lie on the heads of the ribs. The pathology of herpes zoster is not clearly understood, and osteopathic literature teems with cases which have been cured by rectification of a misplaced rib. Head has stated that "this remarkable eruption is associated with disturbances of the peripheral nerves, usually an inflammation of the sensory ganglion or of the nerve," and it is conceivable that pressure of various kinds on the nerve or ganglion on the posterior root may have some influence in its causation. Osteopathic textbooks attach special significance to the sympathetic in the etiology of disease, and probably err as much in their emphasis of this portion of the nervous system as we do by so largely ignoring its influence. They have exalted to the dignity of laws two observations from the works of Hilton and Head respectively: (1) The muscles moving a joint, the skin over the joint, and the interior of the joint are all supplied by nerves from the same source; (2) when a painful stimulus is applied to a part of low sensibility in close central connexion with a part of much higher sensibility, the pain produced is felt in the part of higher sensibility rather than in the part of lower sensibility to which the stimulus was applied.

Their entire pathology circles around these two statements and the special factor of some displaced tissue, and in proportion as there is reality in the pressure on sensitive parts, in the same proportion is there relief afforded by its successful removal. With such a restricted and localized pathology the area of their therapeutic influence must be very circumscribed. But if this fact be recognized and appropriate constitutional treatment adopted, great benefits are likely to accrue from the admission of this mode of treatment into our therapeutical armamentarium.

I am much indebted to Mr. Billington for directing my attention to an article¹ on Paralytic Ileus as a Sequel of Fractured Ribs, by Mr. J. E. Adams. Mr. Adams quotes the following statement of Starling's: "Stimulation of the splanchnic causes complete relaxation of the lower part of the ileum with the rest of the small bowel, but it produces a strong contraction of the muscle fibres forming the ileocolic sphincter." He records two cases of fracture of the ribs in the neighbourhood of their angles—in one case the eighth and ninth ribs, and in the other the eighth, ninth, tenth, and eleventh ribs, being involved—in which the whole of the small intestine was paralysed and the ileocolic sphincter in a state of spasm. Now, as the great splanchnic nerve arises from the sixth to tenth thoracic ganglia, Mr. Adams attributed the paralytic condition of the bowel to irritation of the great splanchnic. Although the thoracic ganglia lie close to the heads of the ribs, he considered that some displacement of the proximal fragments of the ribs may have irritated the sympathetic chain either directly or through the rami communicantes connecting the sympathetic ganglia with the spinal nerves.

He is more inclined to believe in this explanation than in the other possibility, that at the time of the accident a severe blow was administered which caused inhibition of the muscular coats of the bowel.

REFERENCES.

¹ On a Case of Occipito-atloid Disease, *Glasgow Medical Journal*, 1890. ² *The Laws of Life and Health*, Alexander Bryce, p. 257. ³ *Ibid.*, p. 257. ⁴ *Ibid.*, p. 255. ⁵ *Annals of Surgery*, December, 1909.

UNDER the will of the late Miss Julia Woodward, of Clevedon, the University of Bristol receives a donation of £1,000, which is to be used for the foundation of a scholarship either in botany or in music. The cottage hospital at Clevedon is left £200.

TWO neat booklets which have reached our hands contain descriptions of the exhibits at the Japan-British Exhibition, sent by the Wellcome Chemical and Physiological Research Laboratories respectively. Information as to the general lines on which the work is carried on is also given. At the end of each booklet are some pages in Japanese; a study of them leaves an impression of gratitude that so far not even the most advanced degree-granting body has hitherto included Japanese in its medical curriculum.

A Lecture

ON THE

INTERPRETATION OF X-RAY
NEGATIVES.

DELIVERED BEFORE THE ST. PANCRAS AND ISLINGTON DIVISION
OF THE BRITISH MEDICAL ASSOCIATION AT THE
GREAT NORTHERN CENTRAL HOSPITAL.

BY

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INTERPRETATION OF X-RAY PHOTOGRAPHS.

THE *x*-ray negative should be examined, as it is more reliable than a print. It is impossible to reproduce in a print many details which are visible in a negative, and it is possible to have a print touched up so as to make it appear better than the original negative. If a negative is blurred so as to obscure the diagnosis, another should be made. With modern *x*-ray apparatus it is possible to get a sharp skiagraph of any part of the body. It is sometimes necessary to anaesthetize a child in order to make a skiagraph. It should be kept in mind that the *x*-ray negative is produced by a shadow cast on the film of the plate. If one knows the relative position of the *x*-ray tube, the patient, and the plate at the time when the radiograph was made, it is possible to tell on a negative the right side from the left. The radiographer usually places the film side of the plate next to the patient. Suppose one looks at the film side of a negative of the kidney region, and the patient says that the plate was placed on his back, then one can tell that the patient's right kidney is to one's left hand. If a print was made from this negative, the patient's right kidney would be to one's right hand. The information as to left or right side should be supplied by the radiographer, as in some cases it is impossible to tell which is which without his help. The negative should be lighted from behind by a light which passes through opal or ground glass. This light must be neither too strong nor too weak. Special boxes lighted by electric light are made for this purpose. This brings out more detail in the negative than can be seen by holding it up to the light at a window, or to a naked artificial light. By using a proper light one may be able to see details such as a shadowy obscure kidney stone which would be invisible by an unsuitable light. A box fitted with an opal glass window and lighted inside by electric lamps of variable candle power is the best for viewing negatives by.

By tilting the negative at an angle of about 60 degrees to the perpendicular a faint detail may be made more apparent. Sometimes faint details are better seen at a distance of 2 to 3 yards than near at hand. When possible, the right and left sides of the patient should be compared; they should be taken on the same plate at the same time. If this is not possible, an *x*-ray photograph of the normal should be compared with the one under examination. It is important to decide whether a negative is a good enough one from which to form a diagnosis. One must be on guard for distortion of the image from faulty technique, photograph blemishes, forgotten buttons, mercury ointment on the patient's skin, and many other details. If there is any doubt as to diagnosis, a second *x*-ray negative should be made, and in all important cases a second plate should be made after a few days, in order to corroborate the first.

EXAMINATION OF BONE.

In examining a bone the following points should be looked for:

1. Outline of the bone, for irregularities due to fracture, exostosis, detached tendons.
2. Periosteum, which is normally invisible, but may be visible when thickened or detached.
3. Cortex, which may be increased or decreased in thickness or density.
4. Medulla, which may be increased or decreased in thickness or density.

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